

# Comparison of ICOADS ship observations with Historical Weather Maps

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Assess mutual consistency of marine observations of surface pressure and hand-drawn sea level pressure analyses available in digital form.

1. Are the marine observations independent of the maps?
2. Are the maps or marine observations in error?

# Available daily analyses of SLP

1. 1881- 1898: German Morning maps (6Z?)
  - UK Met office “Superfiles”, 5° X 10°
2. 1899-1939:US Historical Weather Map Series (13Z)
  - UK Met office “Superfiles”, 5° X 10°
  - NCAR Northern Hemisphere SLP, 5° X 5°

## US Historical Weather Maps (1899-1928) Use of Marine Data

1. Largely derived from 12Z US Merchant Marine obs: US Weather Bureau Forms 1201 and 1210.
2. “Lack of reliable and consistent pressure...from ships”
3. “...in the earlier years,...it is not uncommon to find ships’ barometer readings *deviating 5 to 10 millibars* from their correct values.
4. “...certain ships...more consistently accurate than others”

How do the maps compare with SLP obs in ICOADS Release 2.0?

**Initial comparison of  
ICOADS and US  
Historical Weather Map  
Feb 1 1899**

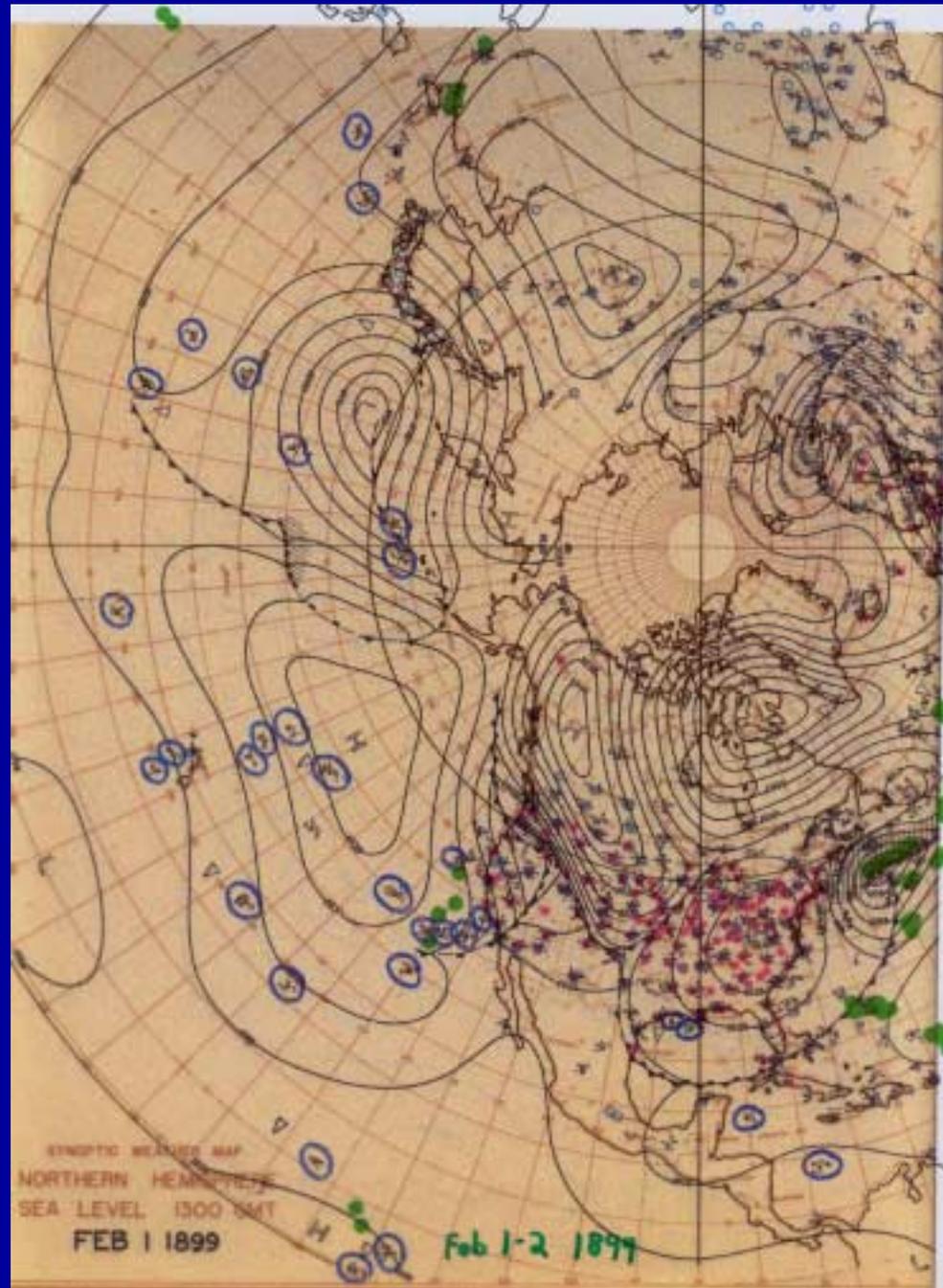
*Large open blue circles:*

US Merchant Marine obs

*Filled green circles:*

ICOADS 2.0 obs from 1-2 Feb 1899

Independence of  
ICOADS and USHWM  
from 1899-1912  
consistent with sources.



**Initial comparison of  
ICOADS and US  
Historical Weather Map  
Feb 1 1913**

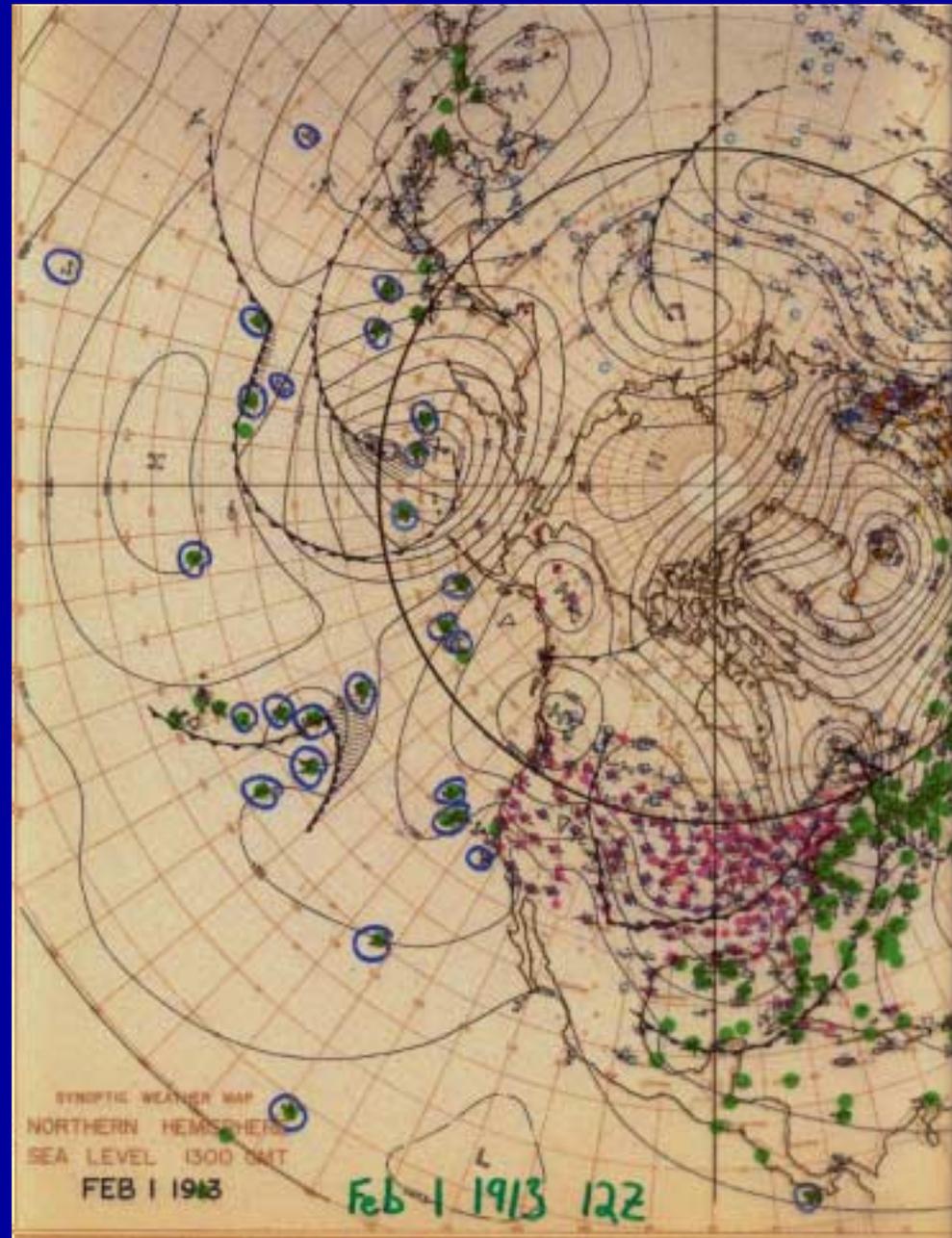
*Large open blue circles:*

US Merchant Marine obs

*Filled green circles:*

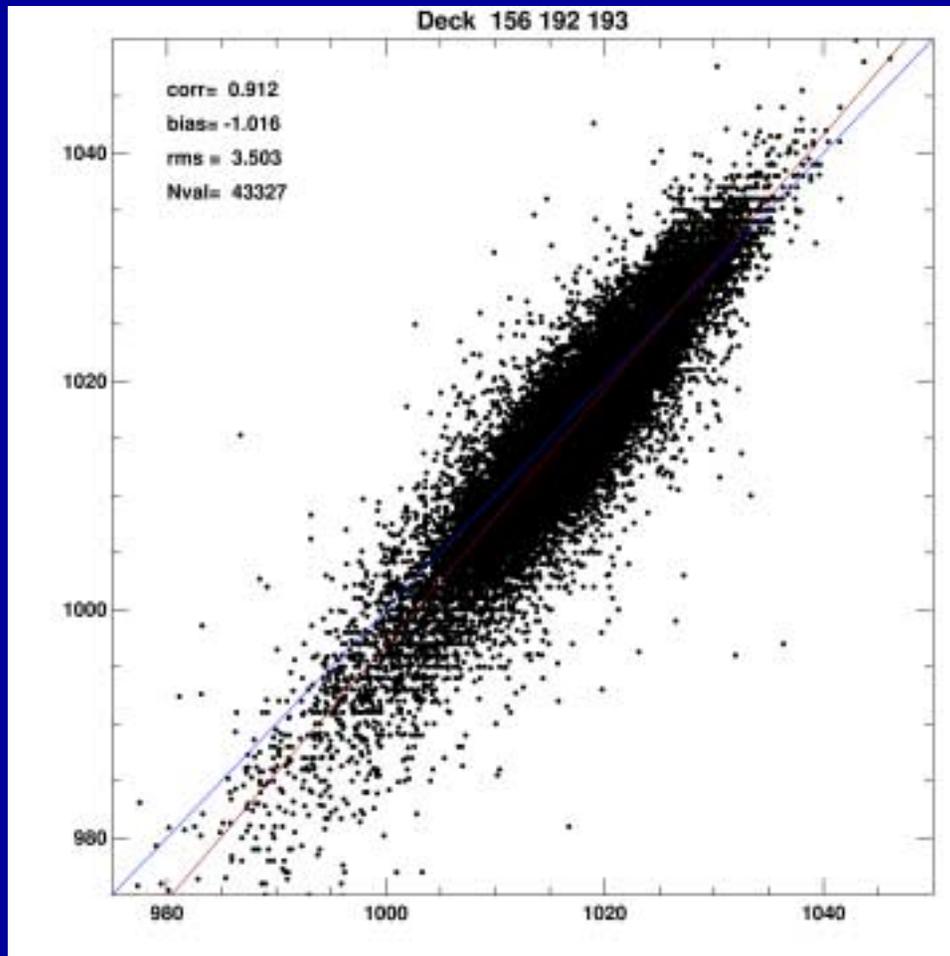
ICOADS 2.0 12Z 1 Feb 1913

USHWM marine  
sources in ICOADS  
starting in 1912.



# Comparison of 6Z HSST, Deutsche Seewarte, and “Dutch” deck SLP obs with German Morning Maps (1881-1898)

Marine SLP obs



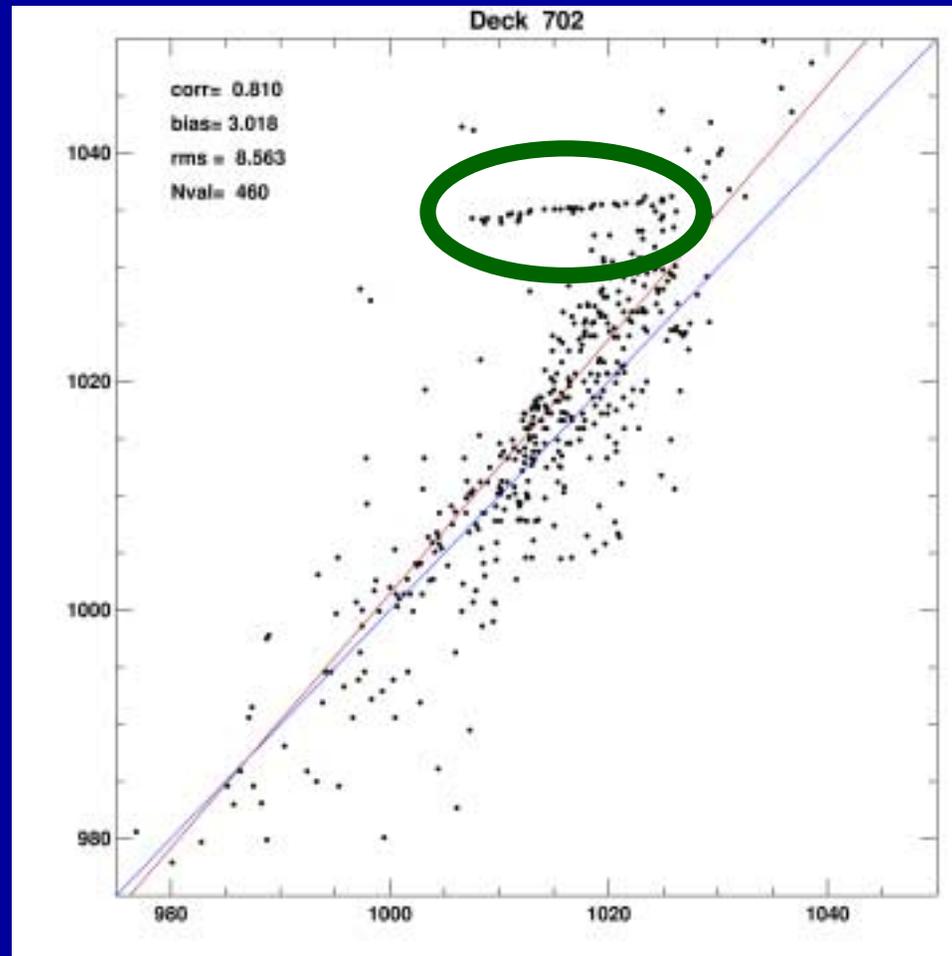
How many  
of these  
observations  
used in map?

Corr = 0.912  
RMS = 3.503mb

Map SLP interpolated to marine ob location

## Comparison of Norwegian deck SLP obs with German Morning Maps (1881-1898)

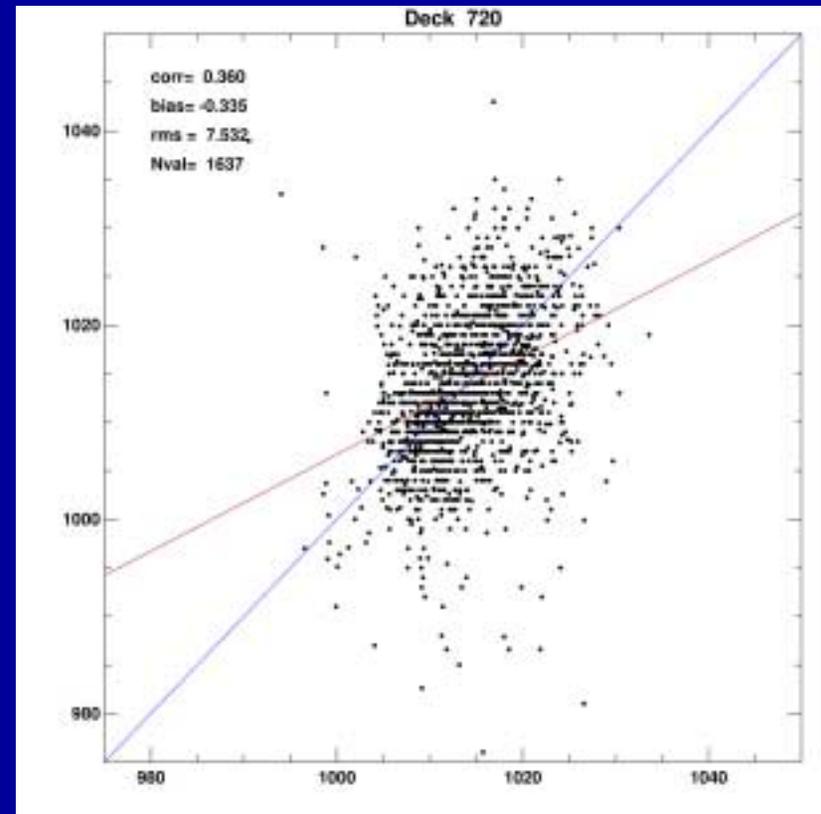
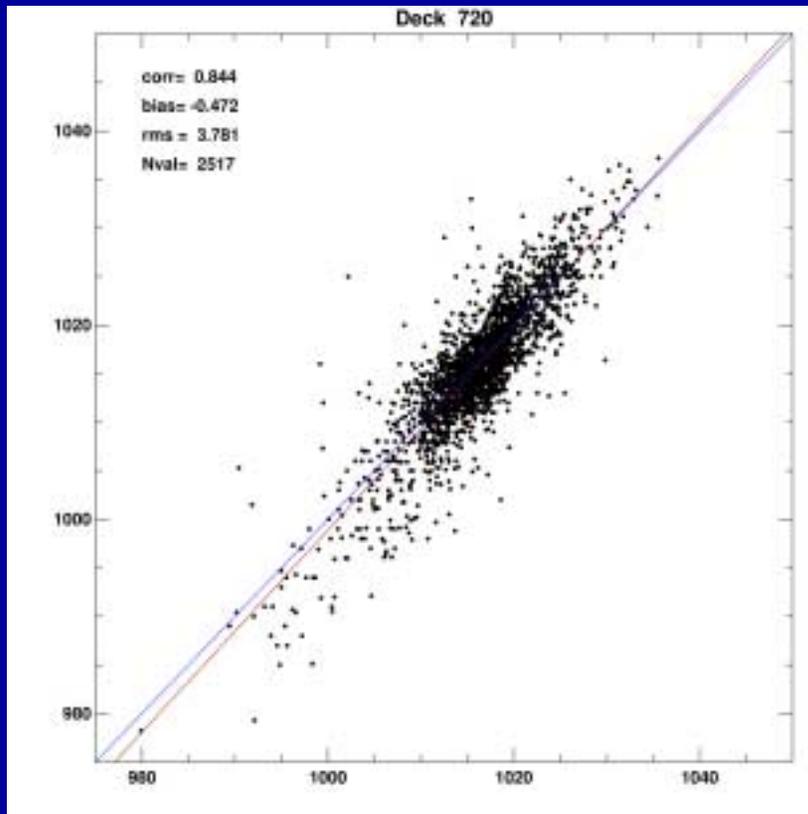
Marine SLP obs



Corr = 0.810  
RMS = 8.563mb

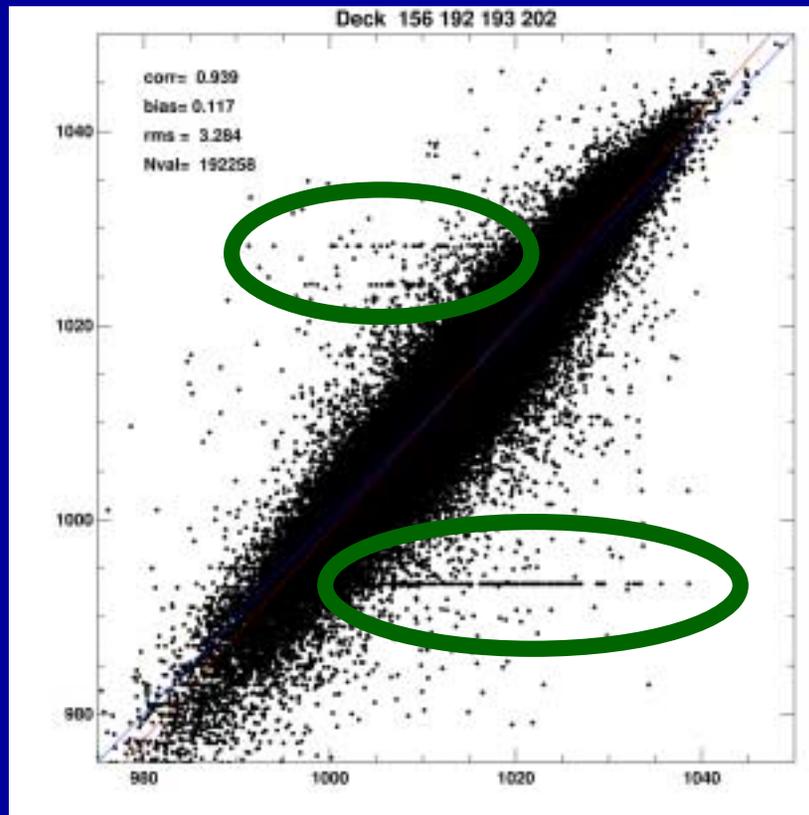
Map SLP interpolated to marine ob location

## Comparison of German Marine Met Archive with German Morning Maps (1881-1898) and USHWM (1899-1928)

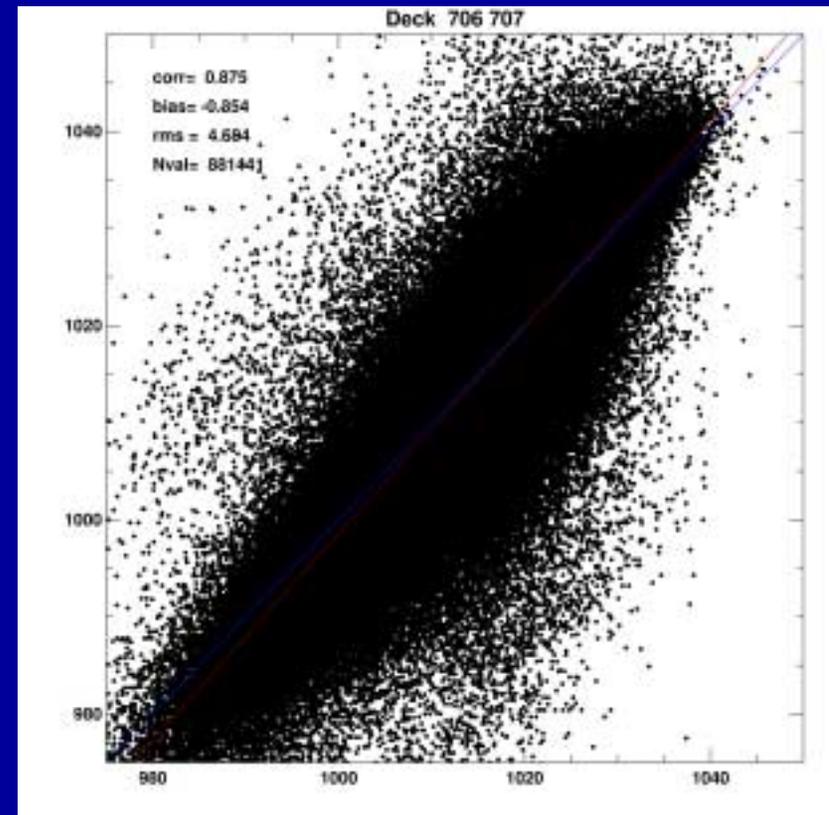


French longitude problem. Used French longitudes to align with HSST.  
Suggests some HSST is incorrectly located or convention changes.

# Comparison of 12Z HSST , Deutsche Seewarte, “Dutch” , and UKMarine Data Bank and US Merchant Marine SLP obs with US Historical Weather Map Series (1899-1928)

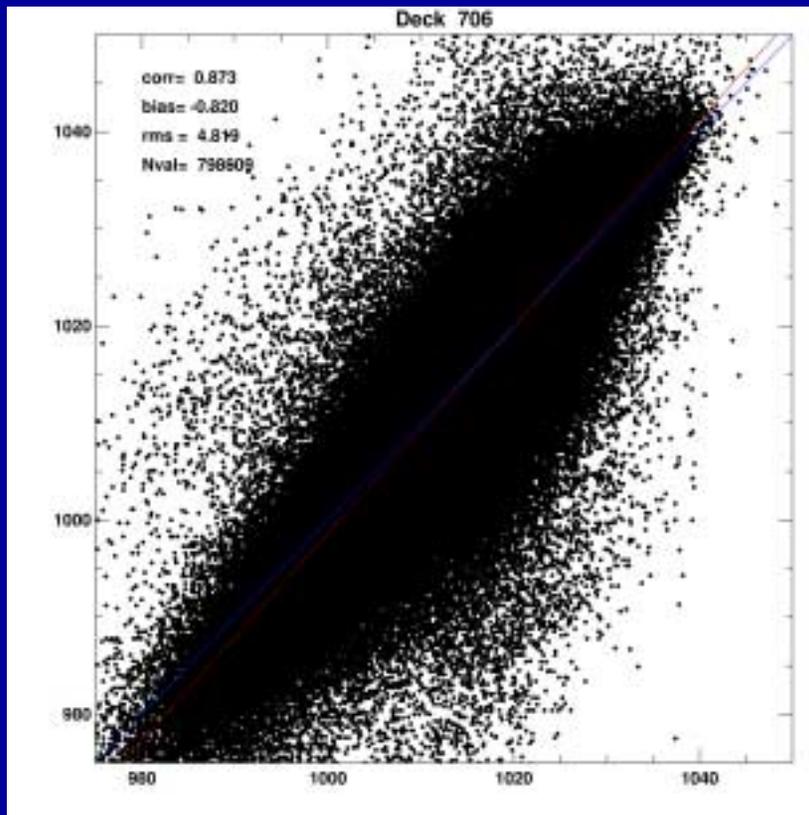


Corr = 0.939  
RMS = 3.284mb

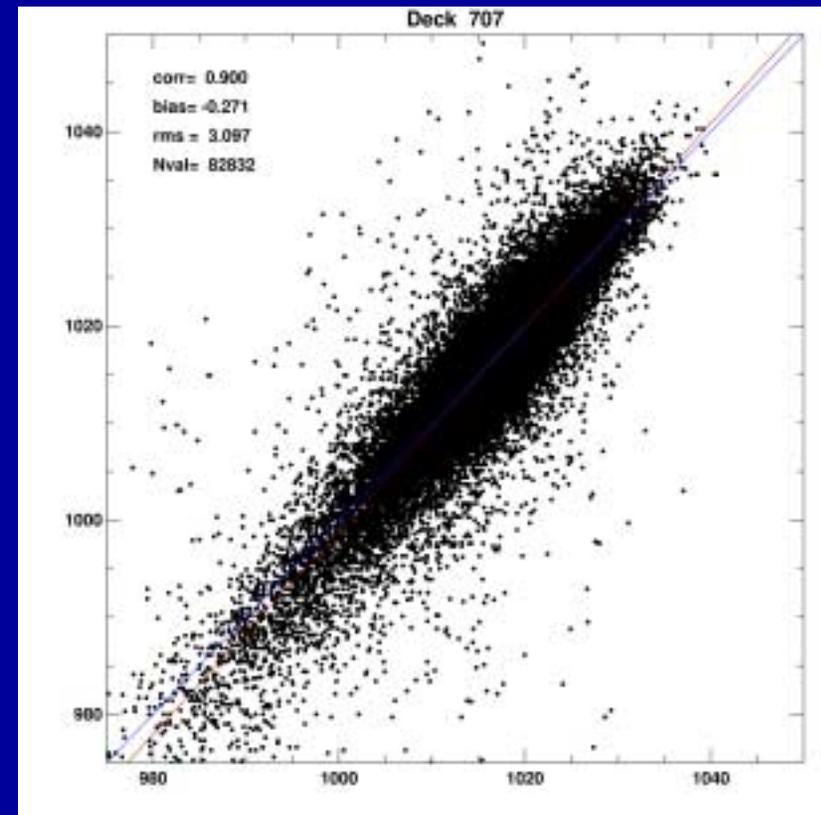


Corr = 0.875  
RMS = 4.684mb

# Comparison of 12Z US Merchant Marine SLP obs in ICOADS decks 706 and 707 with US Historical Weather Map Series (1899-1928)



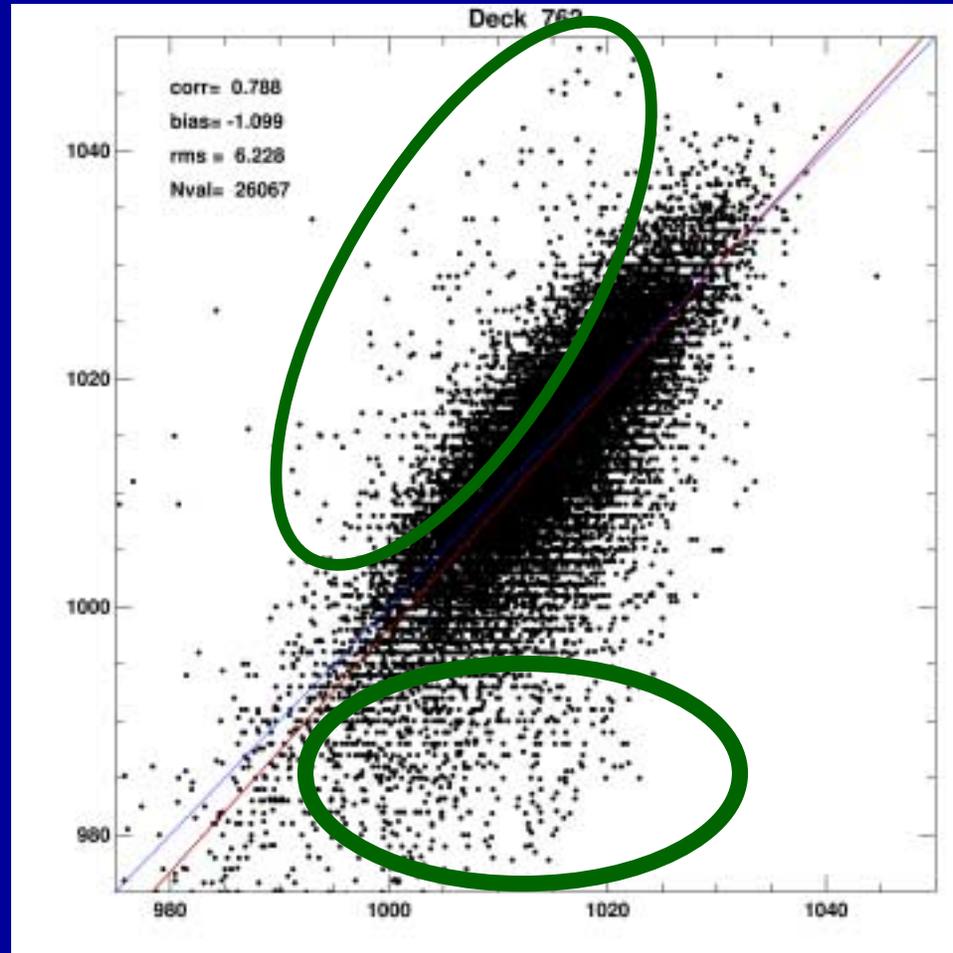
Corr = 0.873  
RMS = 4.814mb



Corr = 0.900  
RMS = 3.097mb

## Comparison of 12Z Kobe SLP obs with US Historical Weather Map Series (1899-1928)

Kobe observations may indicate problems with USHWM in Pacific, particularly timing of storms and cold-air outbreaks.



Corr = 0.788  
RMS = 6.228mb

## Conclusions

1. Mutual consistency check illustrates problems in ICOADS 2.0 and hand-drawn maps.
2. Decks 156,192,193, and 202 look particularly good in general and lend confidence in the maps.
3. Problems in deck 702.
4. Undetected duplicates between 156 and 193 south of 45N, but problem smaller than differences with maps.
5. Maps in the Pacific may have missed some extreme events from poor data coverage-  
Reanalysis is needed!